

REMARKS

Claims 1-32 are rejected. Claims 1-32 remain pending.

35 U.S.C. § 103 Rejections

Claims 1-3, 5-14, 16-25, and 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mamiya et al. (U.S. Patent No. 5,764,322), hereinafter referred to as "Mamiya," in view of Kubo et al. (U.S. Patent No. 6,456,279), hereinafter referred to as "Kubo." The Applicants respectfully submit that the embodiments of the present invention recited in independent Claims 1, 12, and 23 are not taught or suggested by Mamiya alone, or in combination with Kubo. Claim 1 of the present invention recites (emphasis added):

a backlight device;
a reflective display disposed above said backlight device; and
an embedded light guide extending through said reflective display
operable to conduct light from said backlight device to an area above said reflective display wherein the light is reflected onto said reflective display.

Independent Claims 12 and 23 recite similar Claim limitations. The Applicants continue to assert that Mamiya teaches away from the present invention in reciting a transmissive liquid crystal display. For example, in column 1, lines 26-27, Mamiya teaches, "a conventional transmissive type liquid crystal display unit..." The Applicants respectfully submit that the apparatus taught by Mamiya is not operable with the reflective display recited in Claims 1, 12, and 23 of the present invention.

because the opacity of a reflective display makes a backlighting device as taught by Mamiya ineffective.

The Applicants respectfully submit that the apparatus of Mamiya teaches a backlight device which evenly distributes light across a back surface of a liquid crystal display. For example, column 6, lines 66-67 and column 7, line 1 of Mamiya state, "the glass substrate of a liquid crystal display panel is positioned on the upper surface of the light guiding body 114." In other words, Mamiya teaches that the light guiding body is disposed entirely underneath and is separate from the transmissive liquid crystal device. Similar teachings are found in column 8, lines 34-35; column 10; lines 19-24; and column 11, lines 36-41. The Applicants respectfully submit that the claim limitation of embedded light guides which extend through a reflective display recited in Claims 1, 12, and 23 is therefore neither taught nor suggested by Mamiya.

Moreover, Figure 8 of Mamiya shows a liquid crystal display panel 100 comprising array-side glass substrate 120 and cell-side glass substrate 122 disposed above light guiding sheet 1, light reflecting plate 108, and polarizing plate 116. In describing the operation of the light guiding sheet, Mamiya teaches that a great part of the light emitted from light source 114 is incident on the glass substrate 120 and the remaining part is incident on the end face of light guiding sheet 1. Mamiya then teaches that various pathways of the light are refracted by glass substrates 120 and

122, pass through polarizing plate 116, and are reflected by light reflecting plate 108. Subsequently, the light is emitted toward the glass substrate. Because the films 4 and 6, which comprise light guiding sheet 1, are evenly distributed across the entire back surface of liquid crystal display panel 100, the light is distributed in a generally even pattern across the back of the liquid crystal display. While this type of illuminating apparatus is suitable for a transmissive LCD display, the opacity of a typical reflective display renders backlight devices ineffective.

Thus, a typical reflective display is incompatible with the light guiding sheet of Mamiya because the apparatus of Mamiya would evenly distribute light across the back surface of the reflective display. Because a reflective display requires illumination from above the top surface of the display, the apparatus of Mamiya is ineffective for illuminating a reflective display.

The Applicants further submit that Mamiya does not teach or suggest using a reflective display at all in the specification or any motivation for using one. Additionally, the Applicants respectfully submit that Mamiya does not teach or suggest the additional claim limitation of an embedded light guide extending through a reflective display as recited independent Claims 1, 12, and 23 of the present invention. The Applicants respectfully assert that Mamiya does not teach or suggest any structure which extends through a display device of any sort much less the

reflective display recited in Claims 1, 12, and 23 of the present invention.

Furthermore, the light guiding sheet of Mamiya is a separate component of the display assembly from the liquid crystal display.

In embodiments of the present invention, the embedded light guides recited in Claims 1, 12, and 23 extend through the reflective display and conduct light (e.g., through regions between pixels or sub-pixel areas) to the region above the reflective display. The embedded light guides themselves do not illuminate the pixels or sub-pixel regions, but merely conduct light through the reflective display in regions surrounding the pixels or sub-pixels. The light is then reflected back onto the top surface of the reflective display by a top light reflecting film disposed above the reflective display. As a result of the light being reflected by the top light reflecting film, the characters displayed upon the reflective display are then rendered legible. Thus, while a backlight device is used, the reflective display is illuminated by the light reflected from above by the reflective layer.

The Applicants respectfully submit that these limitations are neither taught nor suggested by Mamiya. Accordingly, the Applicants respectfully submit that the rejection of Claims 1, 12, and 23 of the present invention overcome the cited reference under 35 U.S.C. § 103(a).

The Applicants respectfully submit that Kubo fails to overcome the shortcomings of Mamiya. Specifically, Kubo does not teach or suggest an embedded light guide extending through a reflective display operable to conduct light from a backlight device to an area above the reflective display wherein the light is reflected onto the reflective display as recited in Claims 1, 12, and 23 of the present invention.. The rejection cites Figure 4 and column 8, line 65 to column 9, line 20 of Kubo as teaching an embedded light guide extending through a reflective display. The cited portion of Kubo teaches:

FIG. 4 is a cross-sectional view similar to FIG. 3, illustrating another construction of the illumination light source and the operation thereof in the first embodiment of the liquid crystal display device according to the present invention. Specifically, in the present embodiment, a microprism-patterned uneven portion 6 is formed on the touch panel-side surface of the light guide plate 2 which constitutes the illumination device. As shown by arrows in FIG. 4, light from the lamp 3A is reflected and directed in the direction of the liquid crystal panel 1 by the microprism-patterned uneven portion 6, and the light reflected from the liquid crystal panel 1 is transmitted through the touch panel 4 and exits on the display-surface side of the liquid crystal display device. It is desirable for the inclined surface of each microprism to have an angle which enables total reflection of light from the lamp 3A. These microprisms may be formed like ridges in the width direction of the light guide plate 2 (in a direction parallel to the linear lamp). According to the present invention, it is possible to reflect the light of the lamp 3A to the liquid crystal panel 1 with high efficiency. Since the other elements of the construction are similar to that of the first embodiment, the description thereof is omitted.

The Applicants respectfully submit that nowhere in the cited reference does Kubo teach or suggest an embedded light guide structure which extends through a reflective display. The other embodiments taught by Kubo similarly fail to teach or suggest such a structure. Furthermore, Fig. 4 of Kubo clearly shows that the light

guide plate 2 is disposed above, and is a separate component from, liquid crystal panel 1. Therefore, the Applicants respectfully submit that Kubo teaches away from the recited claim limitations of an embedded light guide extending through a reflective display as recited in Claims 1, 12, and 23 of the present invention.

Furthermore, a combination of the apparatus' of Mamiya and Kubo still fails to teach or suggest the claim limitations recited in Claims 1, 12, and 23 of an embedded light guide extending through a reflective display. Additionally, the Applicants respectfully submit that a combination of the apparatus' of Mamiya and Kubo would be inoperable for illuminating a reflective display disposed above a backlight device as recited in Claims 1, 12, and 23 of the present invention. For example, the backlight device of Mamiya is incompatible with the light guide plate of Kubo to illuminate the recited reflective display because the light would illuminate the back side of the reflective display. Therefore, a combination of the cited references does not render obvious the claim limitation recited in the present invention. Accordingly, the Applicants respectfully assert that Claims 1, 12, and 23 overcome the rejections under 35 U.S.C. § 103(a).

Claims 2-3 and 5-11 depend from Claim 1 and recite additional claim limitations descriptive of embodiments of the present invention. Accordingly, the

Applicants respectfully assert that Claims 2-3 and 5-11 also overcome the rejections under 35 U.S.C. § 103(a).

Claims 13-14 and 16-22 depend from Claim 12 and recite additional claim limitations descriptive of embodiments of the present invention. Accordingly, the Applicants respectfully assert that Claims 13-14 and 16-22 also overcome the rejections under 35 U.S.C. § 103(a).

Claims 24-25 and 27-32 depend from Claim 23 and recite additional claim limitations descriptive of embodiments of the present invention. Accordingly, the Applicants respectfully assert that Claims 24-25 and 27-32 also overcome the rejections under 35 U.S.C. § 103(a).

With respect to Claims 2 and 13, the Applicants respectfully submit that Mamiya alone, or in combination with Kubo, fails to teach or suggest an embedded light guide extending through a reflective display as recited in independent Claims 1 and 12. The rejection cites polarizing plate 116 of Figure 14 of Mamiya as anticipating the reflecting film recited in the Claims. The Applicants continue to submit that a polarizing plate would not be reasonably interpreted by one skilled in the art as being comparable or interchangeable with a reflecting film. Furthermore, Claims 2 and 13 recite, "a front light reflecting film disposed above said top surface of

said reflective display." This is clearly shown as front light reflecting film 440 of Figure 4A. The Applicants respectfully submit that Mamiya clearly shows in Figure 14 that polarizing plate 116 is disposed beneath liquid crystal display panel 100. Mamiya also shows a polarizing plate 116 in Figure 8 and states (emphasis added):

The light which propagates through the glass substrate 120 is refracted and incident on the light guiding sheet 1 whose refractive index is slightly greater, and then the light is reflected at the boundary surface of each film, passes through the polarizing plate 116, is reflected by the reflecting plate 108, again passes through the polarizing plate 116, and is incident on the glass substrate as S-polarized light (light path, a, of FIG. 8).

Thus, the teaching of Mamiya specifically states that light passes through the polarizing layer and is not reflected by it. Accordingly, the Applicants respectfully assert that Claims 2, and 13 overcome the cited reference under 35 U.S.C. § 103(a).

With respect to Claims 3, and 14, the rejection cites column 10, lines 45-46 of Mamiya as anticipating the present invention. The Applicants respectfully submit that the combination of Mamiya and Kubo fails to teach or suggest embedded light guides extending through a reflective display to conduct light from a backlight device disposed beneath the reflective display as recited in independent Claims 1 and 12 of the present invention. Therefore, the Applicants respectfully submit that Claims 3 and 14, which depend from Claims 1 and 12 respectively, are not anticipated by Mamiya alone, or in combination with Kubo. Furthermore, the Applicants did not find any teaching in Mamiya to suggest using a electro-luminescent light device as

the backlighting device. More specifically, column 10 lines 45-46 refer to attaching light guiding sheet 1 to the back surface of the array-side glass substrate 120. Accordingly, the Applicants respectfully assert that Claims 3, and 14 overcome the cited reference under 35 U.S.C. § 103(a).

With respect to Claims 5, and 16, the Applicants respectfully submit that the combination of Mamiya and Kubo fails to teach or suggest embedded light guides extending through a reflective display to conduct light from a backlight device disposed beneath the reflective display as recited in independent Claims 1 and 12 of the present invention. Claims 5 and 16 depend from Claims 1 and 12 respectively and recite additional limitations descriptive of embodiments of the present invention. Accordingly, the Applicants respectfully assert that Claims 5, and 16 overcome the cited reference under 35 U.S.C. § 102(b).

With respect to Claims 6 and 17, the rejection cites column 9, lines 10-39 as anticipating the present invention. Claim 6 of the present invention recites (emphasis added);

a brightness enhancing film (BEF) disposed between said backlight device and said bottom surface of said reflective display and for directing light toward said embedded light guide.

Claim 17 recites similar Claim limitations. The Applicants respectfully submit that neither Mamiya nor Kubo teach or suggest the combination of directing light toward

an embedded light guide extending through a reflective display as recited in Claims 6 and 17 of the present invention. Additionally, the Applicants respectfully submit that the backlight apparatus of Mamiya shows backlight 114 disposed to the side of display 100 and extending along one axis thereof. Similarly, Kubo shows illumination device 3 disposed to the side of display 1 and extending along one axis thereof. The Applicants assert that light guide sheet 1 of Mamiya and light guide plate 2 of Kubo are therefore not disposed between a backlight device and the bottom surface of a reflective display as recited in Claims 6 and 17 of the present invention. Accordingly, the Applicants respectfully assert that Claims 6 and 17 overcome the cited reference under 35 U.S.C. § 103(a).

With respect to Claims 7, 8, 18, 19, 29, 30, and 31, the rejection states that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitation. The Applicants respectfully submit that Mamiya alone, or in combination with Kubo, does not satisfy the claimed structural limitation of a backlight device disposed beneath a reflective display, and an embedded light guide extending through the reflective display as recited in Claims 1, 12, and 23 the present invention. Therefore, the recited claim limitations of Claims 7, 8, 18, 19, 29, 30, and 31 are novel. For example, Claims 7 and 8 depend from Claim 1. As discussed above, the Applicants respectfully submit that the apparatus'

of Mamiya and Kubo neither compatible nor operable for illuminating a reflexive display in the manner recited in Claims 1, 12, and 23 of the present invention. Therefore, the Applicants respectfully submit that the combination of Mamiya and Kubo does not satisfy the claimed structural limitation of the present invention recited in Claims 1, 12, and 23. Accordingly, the Applicants respectfully assert that Claims 7, 8, 18, 19, 29, 30, and 31 overcome the cited references under 35 U.S.C. § 103(a).

With respect to Claim 10, the rejection cites column 7, lines 21-25 as anticipating a plurality of embedded light guides which enclose an area of said reflective display. Column 7, lines 21-25 of Mamiya state (emphasis added):

If the refractive index of the light guiding body 104 is smaller than the maximum value of the refractive indexes of the light guiding sheet 1, there is no problem, but it is preferable that the refractive index of the light guiding body 104 be smaller than the minimum value of the refractive indexes of the stacked films.

The Applicants respectfully submit that the cited portion of Mamiya does not teach or suggest a plurality of embedded light guides enclosing an area of a reflective display as recited in Claim 10 and request further clarification. Furthermore, Kubo fails to teach or suggest a plurality of embedded light guides, extending through a reflective display, which enclose an area of the reflective display. Accordingly, the Applicants respectfully submit that the rejection of Claim 10 under 35 U.S.C. § 103(a) is overcome.

With regard to Claim 11, the rejection cites Figure 14, column 7, lines 35-40, and column 10 line 35, as anticipating a plurality of embedded light guides which enclose a sub-pixel of a reflective display. The Applicants respectfully submit that Figure 14 of Mamiya does not show or suggest a sub-pixel area of a reflective display. Column 7, lines 35-40 of Mamiya state (emphasis added):

The light reflected directly by the light guiding sheet 1 has a large number of S-polarized components, and many of the S-polarized components are incident on the glass substrate of the liquid crystal panel by the polarizing plate 116 which allows the S-polarized light to pass through.

The Applicants respectfully submit that this does not teach or suggest a plurality of embedded light guides, extending through a reflective display, which enclose a sub-pixel of a reflective display as recited in Claim 11 of the present invention. Column 10, lines 32-36 of Mamiya state (emphasis added):

For the cell-side glass substrate 122, a color filter of three primary colors (red, green, and blue) is formed in correspondence with each pixel electrode, and between the color filters, there is formed a black matrix which is a light shielding layer.

The Applicants respectfully submit that this does not teach or suggest a plurality of embedded light guides which enclose a sub-pixel of a reflective display as recited in Claim 11 of the present invention. Furthermore, a black matrix which is a light shielding layer between color sub-pixels teaches away from a plurality of embedded

light guides which enclose a sub-pixel of a reflective display as recited in Claim 11 of

the present invention. Furthermore, Kubo fails to teach or suggest a plurality of embedded light guides, extending through a reflective display, which enclose a sub-pixel of the reflective display. Accordingly, the Applicants respectfully submit that the rejection of Claim 11 under 35 U.S.C. § 103(a) is overcome.

With respect to Claim 21, the rejection cites column 1, lines 50-55 as anticipating a plurality of embedded light guides which enclose an area of a reflective display. Column 1, lines 50-55 of Mamiya states:

On the back surface of the light guiding body 104 of FIG. 14 there is a printed dot pattern for diffusely reflecting light that propagates through the light guiding body 104. A reflecting sheet 108 is attached to the entire back surface of the light guiding body 104. A light diffusing plate 110 and one or two prism sheets 112 are provided between the polarizing plate 116 and the light guiding body.

The Applicants respectfully submit that the printed dot pattern taught by Mamiya does not teach or suggest a plurality of embedded light guides which extend through a reflective display device and enclose a portion thereof. Furthermore, Kubo fails to teach or suggest a plurality of embedded light guides, extending through a reflective display, which enclose an area of a reflective display. Accordingly, the Applicants respectfully submit that the rejection of Claim 21 under 35 U.S.C. § 103(a) is overcome.

With respect to Claim 22, the rejection cites Figure 14 and column 7, lines 35-40 as anticipating a plurality of embedded light guides which enclose a sub-pixel of a reflective display. As discussed above with respect to Claim 11, the Applicants respectfully submit that Mamiya does not teach or suggest a reflective display disposed above a backlight device, an embedded light guide extending through the reflective display, or a plurality of embedded light guides enclosing a sub-pixel area as recited in Claim 22. Additionally, the Applicants respectfully submit that Mamiya teaches away from conducting light through embedded light guides enclosing the sub-pixel area in teaching that the sub-pixels are surrounded by a black matrix that is a light shielding layer. Furthermore, Kubo fails to teach or suggest a reflective display disposed above a backlight device, or a plurality of embedded light guides, extending through the reflective display which enclose a sub-pixel of the reflective display. Accordingly, the Applicants respectfully submit that the rejection of Claim 22 under 35 U.S.C. § 103(a) is overcome.

With respect to Claim 23, the rejection cites the rejection of Claims 1 and 11 as anticipating the recited limitations of Claim 23 comprising (emphasis added):

a backlight device;
a reflective display disposed above said backlight device; and
a plurality of embedded light guides extending through said reflective display and enclosing a display area within said reflective display, wherein said embedded light guides conduct light from said backlight device to an area above said reflective display wherein the light is reflected onto said reflective display.

As discussed above with respect to Claim 1, the Applicants respectfully submit that Mamiya does not teach or suggest a reflective display disposed above a backlight device, or a plurality of embedded light guides extending through the reflective display and enclosing a display area of the reflective display. As discussed above with respect to Claims 1 and 11, the Applicants respectfully submit that Mamiya does not teach or suggest a plurality embedded light guides extending through a reflective display that enclose a sub-pixel area. Furthermore, with respect to Claim 11, the Applicants respectfully submit that Mamiya teaches away from conducting light through the area surrounding the sub-pixel area in teaching that the sub-pixels are surrounded by a black matrix that is a light shielding layer. Similarly, Kubo fails to teach or suggest a reflective display disposed above a backlight device, or a plurality of embedded light guides extending through the reflective display that enclose a sub-pixel area. Accordingly, the Applicants respectfully assert that Claim 23 overcomes the rejection under 35 U.S.C. § 103(a).

With respect to Claim 24, the Applicants respectfully submit that Mamiya alone, or in combination with Kubo, fails to teach or suggest a backlight device disposed beneath a reflective display, or a plurality of embedded light guides extending through the reflective display as recited in Claim 23. The rejection cites the rejection of Claim 2 as anticipating a front light reflecting film disposed above a

reflective display and operable to reflect light back onto the reflective display. With respect to Claim 2, the Applicants respectfully submit that a polarizing plate disposed beneath a transmissive LCD display does not teach or suggest a light reflecting film disposed above a reflective display. Accordingly, the Applicants respectfully assert that Claim 24 overcomes the cited reference under 35 U.S.C. § 103(a).

With respect to Claim 25, the rejection cites Mamiya and column 3, lines 17-20 of U.S. Patent No. 6,191,883, hereinafter referred to as "Hirakata." The Applicants respectfully submit that neither Mamiya, Kubo, nor Hirakata teach or suggest utilizing a backlight device to illuminate a reflective display as recited in independent Claim 23. More specifically, Mamiya, Kubo, and Hirakata all teach an illumination device of a side-edge scheme type (e.g., a fluorescent tube or light-emitting diode) and do not teach or suggest a reflective display disposed over a | backlight device, or a plurality of embedded light guides extending through the reflective display as recited in Claim 23 of the present invention. Claim 25 depends from Claim 23 and recites additional claim limitations descriptive of the present invention. Accordingly, the Applicants respectfully assert that Claim 25 overcomes the cited reference under 35 U.S.C. § 103(a).

With respect to Claim 27, the rejection cites the rejection of Claim 23 and column 10, lines 45-46 of Mamiya. However, the Applicants respectfully submit that Mamiya does not teach or suggest a backlight device disposed beneath a reflective display, or a plurality of embedded light guides extending through the reflective display as recited in Claim 23 of the present invention. Claim 27 depends from Claim 23 and recites additional claim limitations descriptive of the present invention. Accordingly, the Applicants respectfully assert that Claim 27 overcomes the cited reference under 35 U.S.C. § 103(a).

With respect to Claim 28, the rejection cites column 9, lines 10-39 of Mamiya as anticipating a brightness enhancing film disposed above a backlight device for directing light toward a plurality of embedded light guides. As discussed above with reference to Claims 6 and 17, the Applicants respectfully submit that Mamiya does not teach or suggest a backlight device disposed beneath a reflective display, or a plurality of embedded light guides extending through the reflective display as recited in parent Claim 23. Additionally, the cited portion of Mamiya does not teach or suggest a brightness enhancing film disposed above a backlight device for directing light toward a plurality of embedded light guides as recited in Claim 28 of the present invention. Accordingly, the Applicants respectfully assert that Claim 28 overcomes the cited reference under 35 U.S.C. § 103(a).

With respect to Claim 32, the rejection cites Figure 14 and column 7, lines 35-40 as anticipating a plurality of embedded light guides enclosing a sub-pixel area of a reflective display. The Applicants respectfully submit that Mamiya does not teach or suggest a reflective display as recited in Claim 23 of the present invention.

Additionally, Mamiya does not teach or suggest a backlight device disposed beneath a reflective display, or a plurality of embedded light guides extending through the reflective display as recited in Claim 23 of the present invention. Furthermore, with respect to the discussion above with respect to Claim 11, the Applicants respectfully submit that Mamiya does not teach or suggest a plurality of embedded light guides enclosing a sub-pixel area of a reflective display as recited in Claim 32 of the present invention. Additionally, the Applicants respectfully submit that Mamiya teaches away from conducting light through the area surrounding the sub-pixel area in teaching that the sub-pixels are surrounded by a black matrix that is a light shielding layer. Kubo similarly fails to teach or suggest a backlight device disposed beneath a reflective display, or a plurality of embedded light guides extending through the reflective display and enclosing a sub-pixel area as recited in Claim 32. Accordingly, the Applicants respectfully assert that Claim 32 overcomes the rejection under 35 U.S.C. § 103(a).

Claims 4, 15, and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Mamiya in view of Kubo and in further view of Hirakata et al.

(U.S. Patent No. 6,191,833) hereinafter referred to as "Hirakata." The Applicants respectfully submit that the recited claim limitations of Claims 4, 15, and 26 are not rendered obvious by Mamiya alone or in combination with Hirakata.

With respect to Claim 4, 15, and 26 the Applicants respectfully submit that Mamiya alone, or in combination with Kubo, does not teach or suggest a backlight device disposed beneath a reflective display, or one or more embedded light guides extending through the reflective display as recited in Claim 1 of the present invention. Moreover, Hirakata does not overcome the shortcomings of Mamiya because Hirakata does not teach or suggest an embedded light guide extending through a reflective display as recited in Claim 1. Therefore, the Applicants respectfully submit that the claimed combination of a backlight device containing at least one light emitting diode, a reflective display, and one or more embedded light guides extending through the reflective display as recited in Claim 4 of the present invention is not rendered obvious by Mamiya alone, or in combination with Kubo and/or Hirakata. Accordingly, the Applicants respectfully assert that the rejection of Claims 4, 15, and 26 under 35 U.S.C. § 103(a) has been overcome.

CONCLUSION

Based on the arguments presented above, the Applicants respectfully assert that Claims 1-32 overcome the rejections of record and, therefore, the Applicants respectfully solicit allowance of these Claims.

The Examiner is invited to contact Applicants' undersigned representative if the Examiner believes such action would expedite resolution of the present Application.

Respectfully submitted,
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